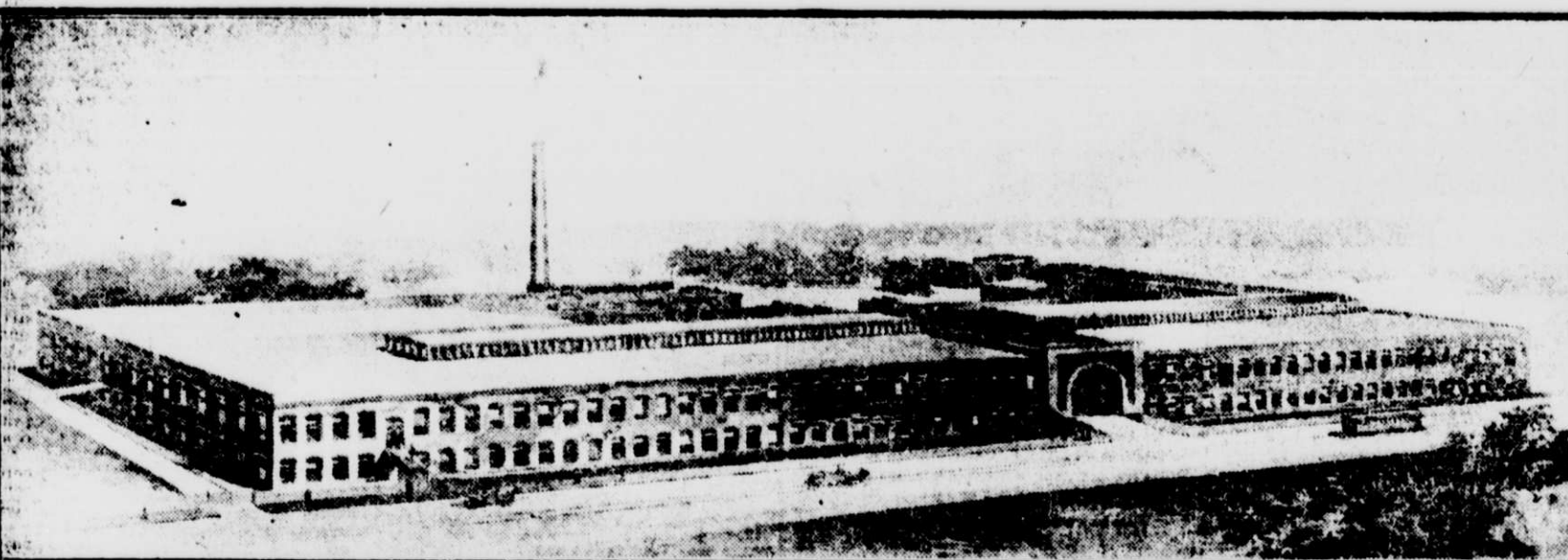


Carding  
and  
Combing  
English and French

**SILESIA WORSTED MILLS, Inc.**  
North Chelmsford, Mass.

Fine Worsted Yarns  
English System  
White and  
Fancy Mixtures



Fine Worsted Yarns  
French System  
White and Mixtures

**SAXONY WORSTED MILLS**  
Newton, Mass.  
ANDREW ADIE  
Proprietor

Fine Merino Yarns  
French System  
White and Mixtures

## HOW THE BIG MILLS MAKE WOOLLEN CLOTH

Intricate Machinery Is Needed  
for Successful  
Weaving.

### THE PROCESS IN DETAIL

What Is Done to the Wool From  
the Time It Enters Fac-  
tory Until It Leaves.

It is a long journey that a bale of wool takes from the time it leaves the shearer until it lies on the counter of a department store. A finished lot of cloth or is draped in a tailor's window as a sample of the latest idea in suitings. In taking this journey the wool may pass over a continent before it reaches the final stage which is to see the transformation from shapeless fleece into cloth woven after a definite pattern and for particular uses.

The sample of cloth which a purchaser thumbs over to decide whether or not it is suitable or the carefully pasted pieces which the salesman exhibits to the retail buyer have brought with them something of the clear air and vastness of the prairie lands in the Far West or the long stretches of Australia, something of the railroader's craft which has made their transportation possible, something of the dyer's art in their delicate yet permanent colors and, most of all, something of the mechanical and artistic genius of the men who operate the great textile mills.

If there is romance in the lonely life of the sheep herder who rides, a solitary figure, against the blue skies of the grazing country and a source for admiration in the work of men who have built the wonderful means of communication between the distant parts of the world, there is no less romance and interest in the woolen mills. New York is not as near the prominent centers of the textile industry as are some other cities, particularly Boston, but there are several large mills in the vicinity of Manhattan Island where a visitor may see the processes by which wool in the bulk is transformed into cloth. There are both worsted mills and woolen mills near New York. The following description concerns only woolen mills, mills where wool is carded and not combed before it is woven.

When the wool reaches a mill it comes in large bales which are covered with burlap or some suitable wrapping, so that the fleece will not be blown away or lost in transit. Wool in this shape may be scoured, washed of its impurities or not. Where unscoured wool is brought it must first be carefully washed and the moisture pressed out. Many mills buy their wool scoured and their first operation is to remove the small particles of vegetable matter in the wool. Sheep will rub against burrs, which will become embedded in the fleece, and small pieces of wood with the leaves of weeds and plants can hardly be eliminated by mere water and soap. Soap and lye is prepared and the wool dumped in it. The wool is not powerful enough to insure the texture of the wool, but sufficiently strong to dissolve

any vegetable matter. Then of course the acid must be thoroughly rinsed out.

No single department in a textile mill is of more importance than the dye house where the wool is dyed. Color counts for a great deal in the making of clothes now. The colors must be "fast"; that is, be able to resist the fading effects of sunshine and must not run in water. No matter what fashions prevail for clothing, there is not much change in the quality of wool that goes into a plant or in the way it is taken there. But fashion concerns itself with colors before it comes to patterns, and the mill that hopes to compete with the others in selling its products must put out cloths of the colors then prevailing.

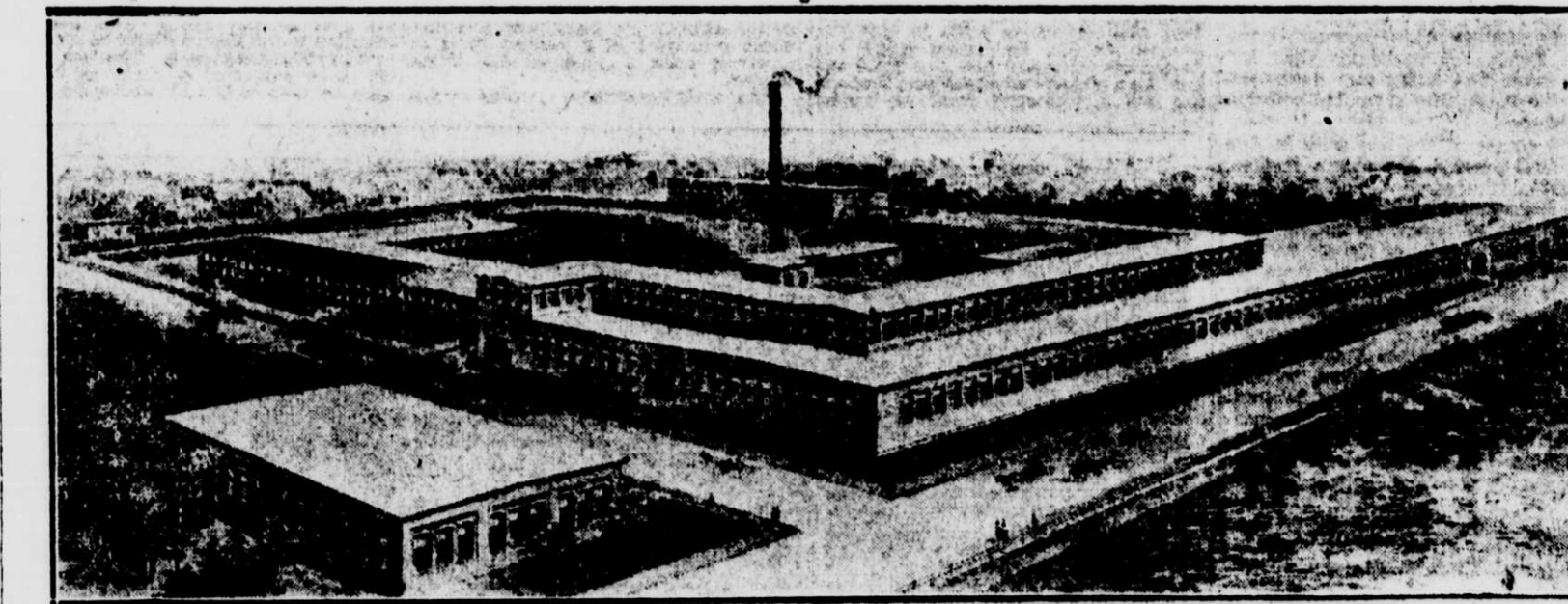
Every large mill has its corps of trained men who visit the fashion centers of America and Europe to forecast the coming styles. What will be the prevailing color for next season is a very vital subject with them, and they frequently send over painted samples to indicate the new color they are willing to risk their judgment in recommending. But even the experts are frequently misled. A shade that would be suited to English surroundings might not be the thing at all in the United States. Several colors which were expected to "catch on" some years ago did not, as the bolts of cloth on the dealers' shelves testify.

It is important that good dyes should be used after the colors have been decided on, dyes that will not injure the texture of the wool and will not fade. To prepare them a head dyer usually has a small laboratory in some part of the dyeing department of a mill. There he experiments with dyes until the exact shade wanted is secured. Coal tar dyes, it is said, are largely used.

Yates are filled with dye stuff and the wool is put in them. Then it is taken out and the moisture extracted. For this purpose centrifugal machines are used at least they are in the Bound Brook mill where the wool is placed in a copper bowl which revolves at a high rate of speed and throws out the moisture, which is collected by a metal screen placed around the centrifugal machine. Men in the dyeing department get good pay.

But the wool is not thoroughly dry yet and so it goes to a drier. This consists of a moving belt which carries the wool over coils and rolls of heated steam pipes until the wool is entirely dry. The machine deposits its contents in a good sized room which is known as the mixing room. For the mixed dress goods which are now popular there are many colors used. This is done by putting wool dyed variously and each color in its proper proportion. The wool lies piled in the room with streaks of red, yellow, purple and other colors appearing here and there. Then it is put in a mixer, which is an ingenious device for mixing the wool. The fleece goes twice through this machine. The first time an air blast blows it back on the floor where it is inspected to see how completely the colors have blended, and then it is run through again, perhaps a third time if the colors distribute themselves slowly. If the wool were put in this machine perfectly dry it would heat and might develop a temperature high enough to burn it from spontaneous combustion. So soap is added, which forms a sort of lubricant.

Now that the wool has been thoroughly mixed it is blown into a room on the floor above and falls like variegated snow on the floor. It is wrapped up in what look like big sheets and carried to the carding



**GEORGE MABBETT & SONS COMPANY,**  
Plymouth, Mass.

room. Thus far the wool has been variously treated, but it is still wool, cleaned and dyed. Now comes the first real change in the material, the change from sheep's fleece into yarn, and this is done by the carding machine.

There is nothing new about carding. The ancients did it and New England housewives used to prepare their yarn before spinning. The carding machine merely does what the home carder with her "cards" which look like currycombs did, only it does the work better and a few thousand times faster. The carding machine consists of a series of rolls of fine wire brushes against which the wool is carried by an endless belt that appears to be made of tiny fishhooks. The entire machine resembles one of a small sized newspaper printing press, where wool instead of paper goes past the rollers.

The fleece is put in the mouth of this machine and starts on its way to become yarn. As it gets near the discharge end of the machine it ceases to be a fluffy sheet and is concentrated into a soft rope about the size of a garden hose. This rope is led from the carding machine to the finisher, where it goes through more rolls, finer ones this time, and is divided into a dozen or more smaller strands, which are called "ropes." It is not quite yarn now, but almost. This final step in making the rope into yarn is next.

The "mule" is a long intricate contrivance, where there are many spools of soft roping, and opposite these spools are other spools or bobbins for receiving the yarn. The moving spools turn slowly and as they turn they are pulled away on a travelling carriage; in other words, the machine spreads out, thus stretching the wool on threads, and they are twisted at the same time. The result is yarn, wound on bobbins.

Yarn gets into the cloth in two ways, as "warp" or "filling." The English call it "weft." The warp is the yarn that forms the surface of the cloth, the part that one sees, and the filling forms the strands over which the warp is woven. The filling is thrown between the warp in shuttles. The filling is likely to be of one color, although there may be several

colors on as many shuttles used in intricate patterns. It is in the warp that the weaver puts his color scheme. To a layman the planning of the colors seems the most baffling thing in the world. The man who arranges it must know the pattern wanted and understand how to get the result that is desired.

In the first place there will be several colors of yarn to go into the warp. This yarn is wound tightly on large rollers called "bobbins," with alternating colors, blue and gray it may be, and then these rollers are placed in the loom. But this is only the beginning. Colors do not run in ordinary stripes; they go zigzag and every other conceivable way. This brings one to the loom proper. The modern loom in principle is not much different from the old fashioned rag carpet loom which nearly every one has seen. There is the warp coming through with strands at either side. V shaped, as it were, or like a wedge of yarn. In the inside of this thread wedge the shuttles ply. Then comes a more intricate part, that played by frames, called "harnesses." These frames are like combs only that each tooth of the comb has an eye in it, through which a strand of yarn is threaded. In weaving a cloth of intricate pattern there may be a score of these harness frames used. The designer of the pattern sends directions as to how these harnesses are to be operated. The directions look to an outsider like a problem in arithmetic, but the girls thread the harnesses the tooth of the comblike harness are called "heddles," and then they are put on the loom. These frames are automatically moved up and down, bringing the yarn now on the upper and now on the under side of the filling as it is thrown through by the shuttles. The movement of these harnesses is regulated by a chain with iron pieces arranged on the links which trip a mechanism that raises or lowers each harness. The pattern of the cloth to be woven is entirely worked out on the chain. It takes considerable experience and skill to be able to work out a pattern on this chain and then have it come out right.

The loom works rapidly and does not

require much attention. Every part of its action is automatic and the shuttles are thrown across 100 times a minute. Slowly the woven cloth rolls itself up in front of the loom and it would appear to the inexperienced observer that the process of making cloth was finished. But it is not. A lot more things happen. The cloth is then taken to a "burling" table. This is merely a table standing in the sunlight where girls go over the cloth to cut out knots or loose threads and note any irregularities in the weave. Another table is waiting where the knots that were cut out at the burling table are sewed fast by hand.

The cloth, however, is loose and needs to be made more compact and the threads closer together. The process which does this is called "fuling." The cloth is shaken and squeezed and tossed about by machinery until the result is accomplished. As in the machine that did the mixing of the wool, here too there must be some lubricant applied so the cloth will not heat. Soap is the agent employed. This soap must be washed out, so the next operation is that of washing the cloth. Machines do it. Then it must be dried. The cloth is run over heated steam pipes until it is dry.

There still are some long or uneven parts in the surface that must be removed, so it goes through a finishing machine called a "shear" where the cloth passes close to the blades of a device which looks like a lawn mower and then it is pressed in a machine that is built in the way that a laundry pressing machine is constructed, hot rollers of either side. Then it is inspected again for the last time, measured and rolled up.

For the rough surfaces of heavy cloth, such as is used for overcoats, there is a special machine used in place of the shear which rubs the surface with a rubber plate with a grinding motion to bring out the chinchillalike roughness of the surface.

Managers of woolen mills must be on the constant watch for fire danger. In the mill visited, as in practically every other, there is an elaborate system of automatic sprinklers, which are set to discharge gallons of water when the heat gets to a certain degree. At night when the mill operators have gone home there is a continual round of watchmen, who inspect every part of the factory at frequent intervals.

The business of making woolen cloth is not an easy one, manufacturers say. They must be constantly on the alert for changes of fashion. They must keep abreast of the times in the quality and styles of their output, for the constant changes in the demand for their wares is a drain on both their ingenuity and their financial resources.

### TAILORS TO THE TRADE.

Mail Order Clothes Making Is Now a Big Factor in the Woolen Industry.

You may have noticed in some country district that the local barber shop had a tailoring sign displayed in the window. Inside there was no indication of cloth for sale or any apparent activity of sewing machine or pressing board. But on the table you might have noticed a large book and opening it found samples of various sorts of cloth. From time to time you might have seen men dropping in at the barber shop, looking over the samples and leaving some sort of instructions with the man who kept the place.

All this is one of the activities of the tailors to the trade. This branch of the textile business is becoming larger and larger with every year. It was not so very long ago that the selling clothing by mail notion first appealed to a show dealer. Why not have people in the outlying districts send in their measurements and have their clothing made for them in the city shops? The man who thought this out did not see any good reason why they should not do that. So he started the system and it has grown with great rapidity.

Every year more clothing houses are giving up their local trade and taking up the newer idea of selling made to order clothing at long distance. Their plain is to find reliable agents in the small towns and give them instructions either

by mail or through a travelling representative as to how to take a customer's measurements accurately. In some localities men give their entire time to soliciting orders for tailors-to-the-trade. They go about from house to house visiting their regular customers and looking for new

ones. It is not necessary, they tell their friends, to make a trip to a distant city in order to secure a good looking suit of tailor made clothes. They can bring the samples to their customer's door. His wife and family can have their share in the selection of suitable material for the new suit. Plates show the various styles of clothing. At first the customers wondered if what they would get from the mail order tailor would look as well as the suit they could get in the local store. But most of them have been satisfied and the business is growing rapidly.

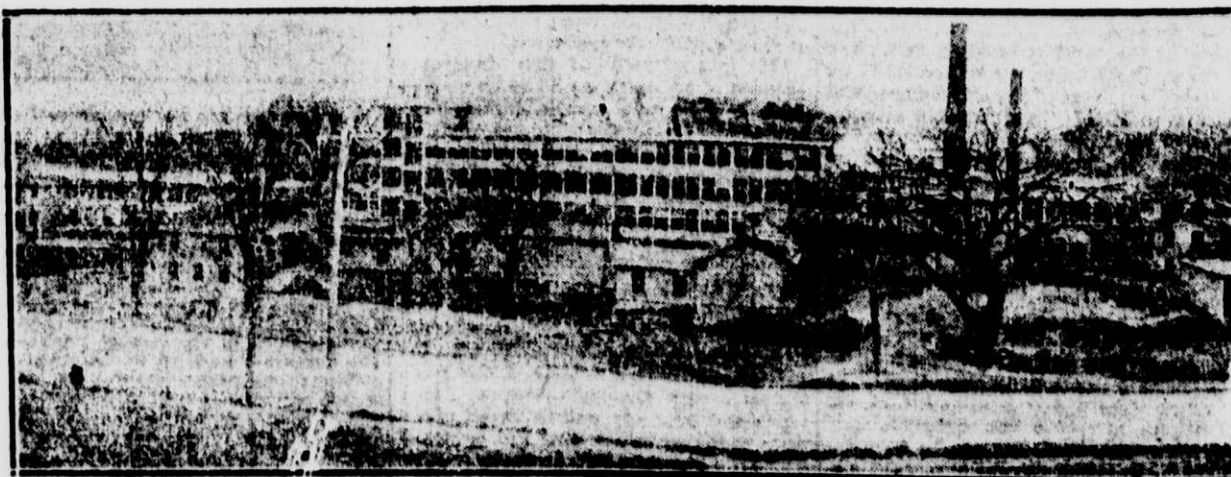
That the tailors to the trade are getting to be big factors in the woolen and worsted goods business is indicated by the close attention now paid to them. Time was when these people were not considered of much importance, but they have gradually worked their way in until to-day several of the big houses in this line consume about as much cloth as some of the largest manufacturing clothiers. The tailor to the trade does not pay much attention to the larger cities, but confines his energies mostly to the country districts, which he covers with a network of agents. Naturally, in catering to country trade, he usually shows many styles of clear finished worsteds. However, in some quarters it is stated that he is not taking anywhere near the amount of such fabrics this year that he took in former years, but is using more worsted chevots and woollens.

Nevertheless several mills which cater especially to this trade state that the business is not so, but that the tailor to the trade has made his purchases in regard to worsteds about the same as formerly. The fact that most worsteds around 50 are inferior to woollens at the same price and the better appearance which the woollens at that price make is a big factor in the large quantity of woollens sold this year. The tailor to the trade, however, generally buys a higher class worsted and it is said that he puts a better fabric into his suits at a given price than the manufacturing clothier does at the same figure. For this reason the appearance of the fabric would not make as great a difference to him as to the ordinary clothier in forcing him into woollens, since at the price he is willing to pay he can get the fabric.

## James and E. H. Wilson

Woolen Manufacturers

Pittsfield, Mass.



Makers of Housatronics

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